Core-top calibration of B/Ca in Pacific Ocean *N. incompta* and *G. bulloides* as a surface water carbonate system proxy

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Modern anthropogenically-induced ocean acidification and global climate change highlight the need for practical methods to reconstruct past ocean carbonate chemistry and atmospheric CO₂ levels to improve understanding of global climate cycles and the marine carbonate system’s response to these forcings. In this study, core-top samples from around the Pacific Ocean are used to generate new calibrations of the B/Ca proxy for the past carbonate system in two upwelling and subpolar species of non-symbiotic planktic foraminifera (*G. bulloides* and *N. incompta*, also known as *N. pachyderma*, dextral). Our results show a significant correlation of B/Ca with \([\text{CO}_3^{2-}]\) and \(\Omega_{\text{calcite}}\), and to a slightly lesser degree with \([\text{B(OH)}_4^-]/[\text{HCO}_3^-]\) and \([\text{B(OH)}_4^-]/[\text{DIC}]\), in both species across a broad range of hydrographic conditions, supporting the application of direct empirical calibrations of B/Ca in planktic foraminifera. Calculated boron partition coefficients \(K_{\text{b}}\) from these samples are uncorrelated with temperature or \([\text{CO}_3^{2-}]\) and vary within and between species; we do not find evidence supporting the application of \(K_{\text{b}}\) to calculate carbonate system parameters from B/Ca. B/Ca in both species studied here is not significantly correlated with pH, suggesting that calculation of pH directly from B/Ca is not suitable. We also explore the application of this proxy in different regions of our Pacific core-top dataset, and discuss potential roles of temperature, depth-related dissolution and shell weight on B/Ca.